BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

ORIGINAL

In the Matter of	)	
	)	
Amendment of Part 15 of the	)	ET Docket No. 99-231
Commission's Rules Regarding	)	
Spread Spectrum Devices	)	
	)	

To: The Commission

COMMENTS OF ALATION SYSTEMS INC.

Alation Systems Inc. ("Alation"), by counsel and pursuant to Sections 1.415 and 1.419 of the Commission's rules,[1] hereby submits Comments in the above-referenced proceeding, in which the Commission proposes to revise Part 15 of its rules to allow wider operational bandwidths for frequency hopping systems operating in the 2400 - 2483.5 MHz band ("2.4 GHz band").[2] Alation supports the proposed rule change, but believes that it is unnecessary for the Commission to impose the limitations on channel occupancy that have been proposed.

I. Introduction

In the *NPRM*, the Commission is proposing, *inter alia*, to modify Part 15 of its rules based on a request by the HomeRF™ Working Group ("HRFWG").[3] The rule change would permit frequency hopping systems in the 2.4 GHz band to operate within 3 MHz and 5 MHz channels in

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1 47 C.F.R. §§ 1.415, 1.419.

2 *See Amendment of Part 15 of the Commission's Rules Regarding Spread Spectrum Devices*, FCC 99-149, ET Docket No. 99-231, at 1 (¶ 1) (released June 24, 1999). ("*NPRM*").

3 *See NPRM*, FCC 99-149, slip op. at 3 (¶ 8).

addition to the 1 MHz channels that are currently permitted. Under this proposal, systems operating in 3 MHz channels would be limited to a maximum output power of 25 dBm and channel occupancy time no greater than 0.05 second per hop.[4] Systems using 5 MHz channels would be limited to 23 dBm of output power with a channel occupancy time no greater than 0.02 second per hop.[5] Under both options, the minimum number of hops would remain unchanged at 75 hops (the same as for existing 1 MHz systems).[6]

For the reasons stated below, Alation supports the HRFWG's proposal in terms of maximum output power, maximum channel bandwidth, and minimum number of hop parameters.[7] In permitting the use of devices with wider frequency hopping bandwidths, however, the Commission should adopt rules that will facilitate the implementation of the most cost efficient implementations of frequency hopping systems. For this reason, Alation does not support the proposed channel occupancy times (*i.e.*, dwell times) because they would restrict certain low cost applications for frequency hopping systems, while providing no significant benefit.

II. Statement of Interest

Alation is a developer and manufacturer of PC-based local area networking ("LAN") products primarily intended for use in home environments. These applications include various high speed, short-ranged products, from components to special PC-based services. Many of these

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4 *See id.* 2 (¶ 5).

5 *See id.*

6 *See id.*

7 Alation does not take any position at this time regarding the Commission's proposal to refine the method for measuring the processing gain of direct sequence systems.

systems incorporate frequency hopping devices using the 2.4 GHz Industrial, Scientific and Medical ("ISM") band. It is projected that millions of users will use these frequency hopping systems to provide internal network communications, and that a variety of types of devices will need to be supported. Such devices include Internet appliances, personal computers, and Internet Protocol-based telephones. Because many of these devices are consumer-oriented, it is especially important that end user costs be minimized. Based on the proposal advanced by the Commission in the *NPRM,* Alation is concerned that the new rules, as currently crafted, would unnecessarily restrict certain low cost implementations for frequency hopping systems — increasing the manufacturing cost of these systems, and ultimately resulting in more costly devices for consumers.

III. Discussion

A. Alation Generally Supports the Commission's Proposal to Allow Frequency Hopping Systems in the 2.4 MHz Band to Operate at Increased Bandwidths.

Alation supports the Commission's determination to enhance spectrum utility for frequency hopping systems in the 2.4 GHz ISM band, along with the proposed output power limitations. As the Commission has concluded, the increase in bandwidth for the operation of non-licensed frequency hopping spread spectrum systems would provide added flexibility to providers and users of non-licensed spread spectrum devices and is needed to meet the business and consumer demand for high-speed data applications, such as access to the Internet. Allowing the operation of frequency hopping systems in wider bandwidths is also in the public interest as it facilitates the continued development and deployment of spread spectrum technology, particularly for high data rate wireless applications — *e.g.*, high speed data links for such applications as

wireless LANs.[8] As the Commission pointed out, there is strong industry and other public support for increasing the bandwidth for non-licensed frequency hopping spread spectrum systems.[9]

In the *NPRM*, the Commission states that certain parties have objected to the HRFWG proposal, claiming that added interference to direct spectrum systems would result.[10] Alation agrees with the Commission that no significant increase in interference to direct sequence spread spectrum would occur.[11] Frequency hopping systems operating under the proposed rule would operate at significantly reduced power than is currently allowed under existing Commission regulations. Therefore, the operation of the proposed frequency hopping systems would have no significant adverse impact on direct sequence signals. As the Commission also observes in the *NPRM*, direct sequence users can improve the robustness of their systems, if necessary, by increasing their processing gain.[12]

B. The Proposed Channel Occupancy Time Limitations Would Unnecessarily Restrict Use of the 2.4 GHz Band for Efficient Spread Spectrum Applications.

While Alation strongly supports the thrust of the Commission's *NPRM*, it disagrees with one element of the proposal — the Commission's proposal to limit channel occupancy time for

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8 *See NPRM*, FCC 99-149, slip op. at 3(¶ 6-8).

9 *See id.* at 3 (¶ 8).

10 *See id.* at 3 (¶ 7).

11 *See id.* at 3 (¶ 9).

12 *See id.* at 4 (¶ 9).

both 3 MHz and 5 MHz bandwidths beyond what is currently required for 1 MHz channels. The Commission proposes the adoption of lower dwell time limits for 3 MHz and 5 MHz channels based upon the belief that limiting the average time of occupancy on any frequency by a frequency hopper device, in addition to requiring operation at reduced output power, will "offset" any potential increase in interference resulting from the operation in increased bandwidths.[13] It is correct that reduced output will provide an offset for increased channel sizes, but the additional imposition of stricter dwell times beyond the 400 msec required for 1 MHz systems is unnecessary to limit potential interference. The lower power levels proposed in this proceeding for 3 MHz and 5 MHz systems will provide all of the margin necessary to prevent harmful interference.

On an instantaneous basis, use of 3 MHz and 5 MHz channels at the power levels proposed actually represents far less interference than under the current rules. This is so because the power spectral density for the proposed wider-bandwidth systems is reduced dramatically. The 3 MHz case is 10 dB lower and the 5 MHz is 14 dB lower in interfering power to any existing 1 MHz receiver on instantaneous basis.[14]

As demonstrated in the attached technical statement,[15] a 3 MHz or 5 MHz frequency hopper, hopping among 75 channels, will not jeopardize current spectrum users even if a hop's channel occupancy extends to 400 msec. This is so, in part, because a decrease in dwell time per channel will not affect average channel occupancy, and therefore will not impact the average

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13 *See id.*

14 *See* Letter from the HomeRF™ Working Group ("HRFWG"), at 3 (dated November 11, 1998).

15 *See infra*, Appendix I.

interference between two systems. Thus, the imposition of the proposed dwell times for 3 MHz and 5 MHz channels is unnecessary to protect other users operating in the 2.4 MHz ISM band.

Additionally, the imposition of different dwell time limitations for 3 MHz and 5 MHz bandwidths would not be in the best interest of the public. While the reduced dwell times described in the *NPRM* do not reduce interference to other users, a device operating at a dwell time of less than 400 msec may have better signal performance (*i.e.*, better noise performance) than a device operating with a 400 msec channel occupancy. However, there is a cost trade-off involved. Units with potentially better noise performance — *i.e.*, designed for lower than 400 msec dwell times — would be significantly more costly to manufacture.

Many users will not require the improved noise performance that would result from using devices operating at the *NPRM*'s proposed channel occupancy limits. These users would operate with, and would choose if available, less expensive systems. Limiting the dwell times beyond that which is now required for 1 MHz systems would be counterproductive because it would eliminate the lowest cost implementations for frequency hopping systems, and unnecessarily increase the cost to the public. It would therefore be inappropriate for the Commission to require dwell times below 400 msec for the wider-bandwidth channels given the lack of any benefit to the public from doing so, and the likely adverse effect of such a limit on some potential users.

Accordingly, Alation urges the Commission to adopt rules that will facilitate consumer choice for selection of frequency hopping devices — that is, those devices with channel dwell times as long as 400 msec. If some users desire frequency hopping devices with improved noise performance, they can choose to pay more for devices that have more rapid channel hopping ability. Imposing the same dwell time restrictions that apply to 1 MHz systems upon 3 MHz and

5 MHz systems will serve the public interest, as consumers will not be forced to buy more expensive systems that they will not need. If the Commission were to adopt the dwell time restrictions as proposed, it would simply reduce efficient use of the band by restricting users that could use low cost implementations from taking advantage of the increased channel bandwidth operations that otherwise would be made possible by adoption of the Commission's proposal.

IV. Conclusion

For the foregoing reasons, Alation supports the Commissions's proposal to increase the bandwidth for frequency hopping systems in terms of maximum power, maximum channel bandwidth, and minimum number of hops parameters. As demonstrated above, however, the proposed maximum channel occupancy times for 3 MHz and 5 MHz channels are unnecessary and

actually would restrict certain low implementation solutions, unnecessarily increasing the cost to the public. Therefore, it is in the public interest for the Commission to adopt the rule change as proposed, with the exception that the 3 MHz and 5 MHz channels should be permitted to operate with the same maximum channel occupancy limit applicable to 1 MHz channels (*i.e.*, 400 msec).

Respectfully submitted,

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TECHNICAL STATEMENT

The following three requirements of Part 15.247 of the Commission's rules restrict the maximum dwell time of allowable frequency hopping systems:

"Each frequency must be used equally on the average by each transmitter." 47 C.F.R. § 15.247 (a)(1);

"Frequency hopping systems operating in the 2400*2483.5 MHz and 5725*5850 MHz bands shall use at least 75 hopping frequencies." 47 C.F.R. § 15.247(a)(1)(ii); and

"The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period." 47 C.F.R. § 15.247(a)(1)(ii).

Reducing the maximum allowable dwell time reduces the amount of time it takes an RF system to acheive its average bandwidth occupancy profile. But a reduction in this parameter is of no value because the long-term average channel occupancy remains unchanged (assuming no other parameter is changed except maximum allowable dwell period). Furthermore, because the FCC measures average time of frequency occupation over a 30 second interval, reducing the system's dwell time to achieve an average time of occupancy profile of less than 30 seconds has no quantifiable impact under the current rules.

The only other parameter that is affected by decreasing the maximum allowable dwell time is the maximum duration of interference between two systems. In general, decreasing the dwell time of the faster hopping system reduces the maximum duration of interference because any interference event is limited to the dwell time of the faster hopping system. Overall interference is not reduced, however, as the number of interference events between faster hopping systems would be correspondingly higher.

In summary, for two systems with dwell times that differ by less than a factor of seventy five, the maximum interference time is determined by the faster hopping system and is independent of the dwell time of the slower system. In either case, the average channel occupancy (and therefore the average interference) is unaffected by decreasing dwell time.

In light of this, Alation believes that it is unnecessary to require reduced dwell times on all frequency hopping systems because leaving the maximum dwell time at 400 milliseconds for 1, 3, and 5 MHz bandwidth systems allows those systems whose applications or customers demand shorter dwell times to implement their systems, while also allowing others to employ systems that can benefit from longer dwell times.

TECHNICAL CERTIFICATION

I hereby certify, under penalty of perjury, that I am the technically qualified person responsible for the preparation of the foregoing technical statement, that I am familiar with Part 15 of the Federal Communications Commission's Rules, and that the data and other information contained in the technical statement and associated comments are complete and accurate to the best of my knowledge and belief.

October 4, 1999

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